$$\lim_{x\to 0} \frac{\sin x}{x} = 1$$

* Prove $\displaystyle \lim_{x\to 0} \frac{1-\cos x}{x} = 0$

$$\lim_{x\to 0} \frac{(1-\cos x)}{x} \frac{(1+\cos x)}{(1+\cos x)}$$

$$= \lim_{x\to 0} \frac{1-\cos^2 x}{x(1+\cos x)} = \lim_{x\to 0} \frac{\sin^2 x}{x(1+\cos x)}$$

$$\frac{\sin x}{x} \cdot \frac{\sin x}{1+\cos x}$$

$$= \lim_{x\to 0} \left(\frac{\sin x}{x}\right)^2 \cdot \frac{x}{1+\cos x} = 1^2 \cdot \frac{0}{1+\cos 0}$$

$$\lim_{x\to 0} \left[\frac{\sin x^2}{x^2} \cdot \frac{x}{1+\cos x}\right] = 1 \cdot \frac{0}{1+1} = 0$$

*

$$\left(\frac{\sin x}{x}\right)^2 \cdot \frac{x}{(1+\cos x)}$$

$$\lim_{h\to 0} \frac{\sin(x+h)-\sin x}{h} \qquad \frac{\sin x\cos h + \cos x \sin h - \sin x}{h}$$

$$\frac{-\sin x + \sin x \cos h + \cos x \sin h}{h} \qquad -\frac{\sin x(1-\cos h) + \cos x \sin h}{h}$$

$$-\frac{\sin x(1-\cos h)}{h} + \frac{\cos x \sin h}{h}$$

$$\lim_{h\to 0}\left[-\sin x \, \frac{1-\cos h}{h} + \cos x \cdot \frac{\sin h}{h}\right]$$

$$\cancel{\lim_{h\to 0} \sin x \lim_{x\to 0}} \quad 0 \quad + \quad \cos$$

$\frac{d}{dx}\tan x$, $\frac{d}{dx}\cot x$, $\frac{d}{dx}\sec x$, $\frac{d}{dx}\csc x$

Sect. 3.5 #1-10 (enough), 12, 14, 15, 17, 20, 21, 25, 26,

29, 30, 35, 36, 39

Quiz - Tues 3.1-3.4